



Introduction

This document is a guide to the AT command set, a firmware application embedded in ST Bluetooth® module series: SPBT2532C2, SPBT2632C2A, SPBT2632C1A, and in ST evaluation tools STEVAL-SPBT2ATV2, STEVAL-SPBT2ATV3, STEVAL-SPBT3ATV3, STEVAL-SPBT4ATV3.

The AT command set is a user-friendly interface available in two options. The AT firmware implements a basic point-to-point cable replacement, while the AT2 firmware, in addition to the cable replacement, supports communication with smartphones.

The SPBT2532C2.AT module is equipped with the AT firmware implementing a serial cable replacement service using the Bluetooth® serial port profile, SPP.

The SPBT2532C2.AT2, SPBT2632C2A.AT2 and SPBT2632C1A.AT2 modules are equipped with the AT2 FW release, which offers SPP and IAP (iPOD accessory protocol) service, supporting communication with smartphones and Apple iOS Bluetooth®-enabled devices.

This document provides a detailed description of each command supported by the AT FW and AT2 FW interface. [Appendix A](#) contains the list of the system configuration variables of the AT command with each default value and range, both for AT and AT2 FW.

When it is not necessary to specify the FW version, “ATn” is used.

Each of the subsections in [Section 3: AT command list](#) gives the definition, syntax and responses of each command.

Error responses are also detailed in [Section 4](#) of this document.

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1 Definition and acronyms

The following table lists the acronyms used in this document.

Table 1. Definitions and acronyms

| Term | Description/meaning |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| ASCII | American standard code for information interchange, a standard describing encoding of characters; the use in this document is strictly US 7-bit |
| BD | Bluetooth device |
| DCD | Modem signal "data carrier detect"; indication from a modem that a connection has been made through, for example, a dialup connection |
| DTE | Data terminal entity, e.g., a computer |
| DTR | Modem signal "data terminal ready"; indication to a modem that the data terminal is ready for a connection |
| DUN | Dialup networking (profile) |
| GPIO | General purpose input-output |
| IAP | iPOD accessory protocol |
| LAN | Local area network |
| PIN | Personal identification number |
| SPP | Serial port profile |
| UART | Universal asynchronous receiver-transmitter |

2 Overview

This chapter gives a basic overview of the AT and AT2 libraries which include a set of commands described in detail in [Section 3. Appendix A](#) describes the two sets of configuration variables, relevant to AT and AT2 FW versions. The AT and AT2 FW are third party IPs developed by Amp'edRF.

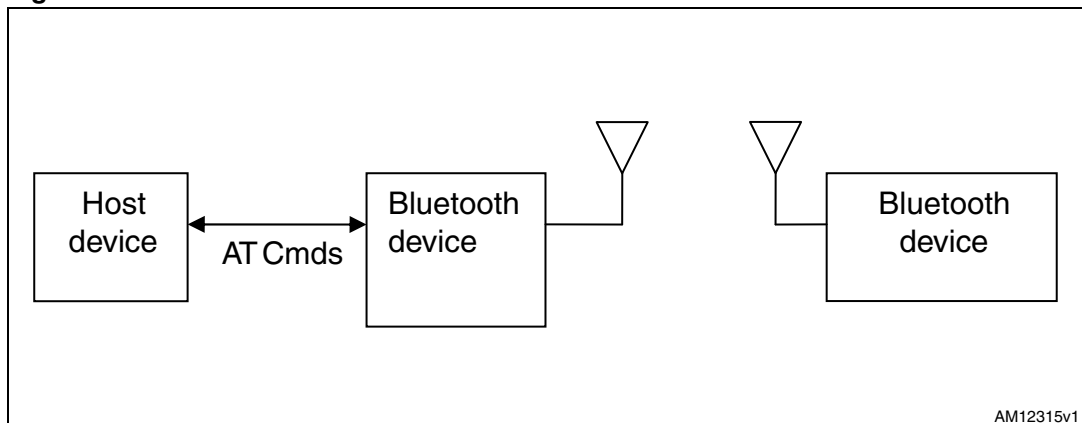
Figure 1. FW developer



2.1 AT command FW interface overview

The AT command FW is a cable replacement application that provides communication between Bluetooth-enabled devices. A serial port is used to communicate with a host device through an AT command interface as shown below.

Figure 2. Communication between hosts



The AT command FW provides the following basic features:

- AT2 FW supports point-to-point and multipoint connections, while AT FW supports only point-to-point connections.
- Serial port profile, SPP, is supported for both client and server applications.
- iPOD accessory protocol, IAP, is supported only by AT2 FW, enabling communication with Apple iOS Bluetooth-enabled devices.
- Command and bypass modes: it is possible to switch between command and bypass (data transmit/receive) modes during an active connection.
- Security: bonding and data encryption provides a secure link between two devices.
- Power conservation: use of the Sniff feature to minimize power consumption is supported only with AT2 FW.
- Variable baud rates: the serial port can be configured for the following baud rates: 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k (default), 230.4k, 460.8k, 921.6k

3 AT command list

This chapter details each of the AT commands including brief descriptions of behavior, syntax of the command, context of the command, and types of responses.

This AT command FW reference guide covers the commands listed in [Table 2](#).

The table compares the AT FW release to the new AT2 FW, pointing out additional features.

Table key:

- S: command is supported in this release
- NS: command is not supported in this release
- New: command is introduced with this release

Table 2. AT command list summary

| Command | AT FW version V1.2 | AT2 FW version V1.3 |
|-------------------|--------------------|---------------------|
| Bond | S | S |
| BtcVersion | New | S |
| Build | S | S |
| Bypass | S | S |
| ChangeBaud | S | S |
| ChangeDefaultBaud | S | S |
| Config | S | S |
| Cptest | NS | New |
| DefaultLocalName | S | S |
| DeleteSmartCable | S | S |
| DisableBond | S | S |
| Discovery | S | S |
| EnableBond | S | S |
| EraseBondTable | S | S |
| ExitSniff | NS | S |
| GetBdAddress | New | S |
| GPIOConfig | S | S |
| GPIORead | S | S |
| GPIOWrite | S | S |
| HostEvent | S | S |
| IAPConnect | NS | New |
| IAPDisconnect | NS | New |
| LinkDisconnect | New | S |
| LocalName | S | S |

Table 2. AT command list summary (continued)

| Command | AT FW version V1.2 | AT2 FW version V1.3 |
|-------------------|--------------------|---------------------|
| PortDisconnect | S | NS |
| Reset | S | S |
| RoleSwitch | S | S |
| ShowDev | S | S |
| SmartCableSetup | S | S |
| Sniff | NS | S |
| SPPConnect | S | S |
| SPPDisconnect | S | S |
| StreamingSerial | S | S |
| UpdateInquiryScan | S | S |
| UpdatePageScan | S | S |
| Version | S | S |

The following subsections describe each of these commands in detail, including a description of behavior, syntax (including possible parameter values), and types of responses.

Some responses will not be "immediate". Where applicable, these will be noted and will include an approximate delay before response.

For commands with optional parameters, all possible forms will be listed under the syntax subsection.

Error responses are described in [Section 4](#).

3.1 Bond

The Bond command is used to initiate bonding with a specified device. A personal identification number (PIN) is also required with this command.

3.1.1 Syntax

AT+AB Bond [BD Addr] [PIN]

Where [BD addr] is the BD Address of the remote device with which to bond and [PIN] is the PIN code to use (up to 16 characters).

3.1.2 Responses

If the request is successfully submitted, the response is:

AT-AB BondPending [Remote BD Addr]

If the operation is successful, the response is:

AT-AB BondOk

If the operation fails, the response is:

```
AT-AB BondFail
```

3.2 BtcVersion

The BtcVersion command is used to return the current ID of the Bluetooth controller chip.

3.2.1 Syntax

```
AT+AB BtcVersion
```

3.3 Build

The Build command is used to return the current build ID of the application firmware.

3.3.1 Syntax

```
AT+AB Build
```

3.3.2 Responses

If the operation is successful, the response is:

```
AT-AB ATn FW Build [date]
```

where [date] is the date code of the application firmware.

3.4 Bypass

The bypass command is used to return the ATn FW interface to the bypass mode, if a connection is still available. A possible use for this command is to change a setting after a connection has been made (such as the UART baud rate). If the ATn FW interface does not have a connection, it will respond as if the connection is down.

3.4.1 Syntax

```
AT+AB Bypass
```

3.4.2 Responses

If a connection is still available, the response is:

```
AT-AB -BypassMode-
```

If there is currently no connection, the response is:

```
AT-AB ConnectionDown
```

3.5 ChangeBaud

The host sends the ChangeBaud command in order to change the local UART speed to a new speed identified by the host. This setting will only remain in effect during the current session - until reset.

3.5.1 Syntax

AT+AB ChangeBaud [rate]

where [rate] is the new baud rate:

- 1200
- 2400
- 4800
- 9600
- 19,200
- 38,400
- 57,600
- 115,200
- 230,400
- 460,800
- 921,600

3.5.2 Responses

If the change is accepted, the response is:

AT-AB Baudrate Changed

The actual change will not occur until the response has been completely transmitted.

3.6 ChangeDefaultBaud

The host sends the ChangeDefaultBaud command in order to change the default UART speed to a new speed identified by the host. This command is used to override the default baud rate from the dynamic configuration script so that the device does not require reprogramming to update this setting. The new baud rate is updated permanently until the device is either re-programmed or another ChangeDefaultBaud command is issued. The baud rate specified in the command will not take effect until the device is reset. To change the baud rate of the current session, use the ChangeBaud command.

3.6.1 Syntax

AT+AB ChangeDefaultBaud [rate]

where [rate] is the new baud rate:

- 1200
- 2400
- 4800
- 9,600
- 19,200
- 38,400
- 57,600
- 115,200

- 230,400
- 460,800
- 921,600

3.6.2 Responses

If the change is accepted, the response is:

```
AT+AB Baudrate Changed
```

3.7 Config

The Config command is used to set a configuration variable.

3.7.1 Syntax

```
AT+AB Config [variable name] = [variable value]
```

The list of configuration variables is shown in [Appendix A](#).

3.8 Cptest

The Cptest command allows to verify the connection of the MFI chipset.

3.8.1 Syntax

```
at+ab cptest
```

3.8.2 Responses

If the coprocessor chipset is correctly connected, the output of the command gives infos (versions and ID) about the coprocessor. Example:

- CP Device Version: 0x03
- CP Firmware Version: 0x01
- CP Authentication protocol Major version: 0x02
- CP Authentication protocol Minor version: 0x00
- CP Device ID: 0x00000200

When the coprocessor is not connected or badly connected the output of the command is

```
CP Data Fail or CP Address Fail.
```

3.9 DefaultLocalName

The DefaultLocalName command is used to set the name of the device to the name that is reported during device discoveries. By default, the ATn FW interface uses "Amp'ed UP!". Changing the name using this command will permanently change the local name, unlike the LocalName command, specified hereafter.

3.9.1 Syntax

```
AT+AB DefaultLocalName [name]
```

Where [name] is a string for the new local name, case sensitive (up to 20 characters). The space character is allowed; the name is assumed to be all text up to the end of the command.

3.9.2 Responses

If the operation is successful, the response is:

```
AT-AB LocalNameOk
```

3.10 DeleteSmartCable

The DeleteSmartCable command removes the current Smart Cable settings that were entered using the SmartCableSetup command, but not the setting from the dynamic configuration. The Smart Cable will then be deactivated for the remainder of this session. Upon reset, if a dynamic configuration for a Smart Cable exists, it will be activated. If there is no dynamic configuration Smart Cable setup, then this feature will remain deactivated.

3.10.1 Syntax

```
AT+AB DeleteSmartCable
```

3.10.2 Responses

If the operation is successful, the response is:

```
AT-AB DeleteSmartCableDone
```

3.11 DisableBond

The DisableBond command is used to deny new bonding with a device. This command cannot be used while a connection is active.

3.11.1 Syntax

```
AT+AB DisableBond
```

3.11.2 Responses

If the operation is successful, the response is:

```
AT-AB BondDisabled
```

3.12 Discovery

The discovery command is used to initiate a device discovery. The command will return the number of responses of nearby devices and then the individual responses with BD address and name of device. The number of devices returned is limited to 10.

Inquiry is performed with an interval of 10.24 seconds.

The devices are reported in the same order as the original inquiry results.

3.12.1 Syntax

```
AT+AB Discovery
```

3.12.2 Responses

When the discovery command has been accepted, the response is:

```
AT-AB InqPending
```

Once the initial inquiry is complete and discovery has been started, the response is:

```
AT-AB DiscoveryPending [num]
```

where [num] is the number of devices found, in decimal (up to 10 will be reported).

For each name request that is successful, the response uses the returned names in the following format.

```
AT-AB Device [BD addr] [name]
```

where [BD addr] is in hexadecimal with the most significant byte first. [name] is a string in double quotes " ".

For each unsuccessful name request, the corresponding name is replaced by "Unknown". The name request may not be successful if unable to make a connection for the request.

```
AT-AB Device [BD addr] "Unknown"
```

3.13 EnableBond

The EnableBond command is used to enable bonding with another device. The BD Address, PIN and timeout parameters are optional.

When no BD Address is specified, requests from all BD Addresses are allowed.

If a BD Address is specified, bonding requests from devices with BD Addresses other than the one specified will fail and the existing link key will be deleted for that device.

Optionally, a PIN code may be entered with this command. If no PIN code is specified, the default PIN code will be used.

Also, a timeout value, in seconds, may be entered after the PIN code. Bonding will be disabled automatically after the requested timeout. If no timeout is specified, bonding is enabled until reset or until the DisableBond command is used.

If this command is issued multiple times, only the last PIN and BD address are saved. Also, if this command is issued before the first timeout occurs, the subsequent command will extend the timeout. The timeout is always set to the specified time beyond the last received EnableBond.

3.13.1 Syntax

```
AT+AB EnableBond
AT+AB EnableBond [BD addr]
AT+AB EnableBond [BD addr] [PIN]
AT+AB EnableBond [BD addr] [PIN] [timeout]
```

Where [BD addr] is the BD Address of the remote device with which to bond, [PIN] is the PIN code to use (up to 16 characters), and [timeout] is the duration of the timeout in seconds (1 to 1000).

3.13.2 Responses

If the operation is successful, the response is:

```
AT-AB BondEnabled
```

If bonding has been initiated by a remote device, the notification is:

```
AT-AB BondPending [BD addr]
```

where [BD addr] is the BD address of the remote device that initiated the bonding.

If bonding has occurred, the notification is:

```
AT-AB BondOk [BD addr]
```

where [BD addr] is the BD address of the remote device with successful bonding.

If bonding was initiated by a remote device but failed, the notification is:

```
AT-AB BondFail
```

When the time limit for bonding has expired, the notification is:

```
AT-AB BondDisabled
```

3.14 EraseBondTable

The EraseBondTable command is used to erase all of the bonded device entries. Single devices cannot be erased with this command

3.14.1 Syntax

```
AT+AB EraseBondTable
```

3.14.2 Responses

If the operation is successful, the response is:

```
AT-AB BondTableErased
```

3.15 ExitSniff

The ExitSniff command is used by AT2 FW to switch a device from sniff mode to active mode.

3.15.1 Syntax

```
AT+AB ExitSniff [BD address]
```

Where [BD address] is the BD address of the device to be switched to active mode.

3.15.2 Responses

If the operation is successful, the response is:

```
AT-AB ActiveMode
```

3.16 GetBDAddress

The GetBDAddress command is used to read the local device's Bluetooth device address or MAC address.

3.16.1 Syntax

```
AT+AB GetBDAddress
```

3.16.2 Responses

If the operation is successful, the response is:

```
AT-AB BD_ADDR = [BD address]
```

3.17 GPIOConfig

The GPIOConfig command is used to configure a GPIO pin to input or output.

3.17.1 Syntax

```
AT+AB GPIOConfig [GPIO Pin] [Configuration]
```

where [GPIO Pin] is the pin number of the desired GPIO to configure. The GPIO numbering depends on the specific HW used.

[Configuration] is "i" or "I" for input and "o" or "O" for output.

3.17.2 Responses

If the operation is successful, the response is:

```
AT-AB GPIOConfigDone
```

3.18 GPIORead

The GPIORead command is used to read a GPIO pin. A GPIO may be read while configured as either an input or output.

3.18.1 Syntax

```
AT+AB GPIORead [GPIO Pin]
```

where [GPIO Pin] is the pin number of the desired GPIO to read. The GPIO numbering depends on the specific HW used.

3.18.2 Responses

If the operation is successful, the response is:

```
AT-AB GPIOReadDone [result]
```

Where [result] is either a 1 to indicate high, or 0 to indicate low.

3.19 GPIOWrite

The GPIOWrite command is used to set a GPIO pin to high or low. A GPIO may only be set when configured as an output.

3.19.1 Syntax

```
AT+AB GPIOWrite [GPIO Pin] [Setting]
```

where [GPIO Pin] is the pin number of the desired GPIO to read. The GPIO numbering depends on the specific HW used.

[Setting] is a 1 to set a pin to high and a 0 to set a pin to low.

3.19.2 Responses

If the operation is successful, the response is:

```
AT-AB GPIOWriteDone
```

3.20 HostEvent

The HostEvent command is used to enable/disable the host notification strings. This will override the default setting in the dynamic configuration only for the current session, until reset.

3.20.1 Syntax

```
AT+AB HostEvent [Enable/Disable]
```

Where [Enable/Disable] is an "e" or "E" character to enable this parameter and a "d" or "D" character to disable it.

3.20.2 Responses

If the feature is successfully enabled, the response is:

```
AT-AB HostEvent Enabled
```

If the feature is successfully disabled, there is no response because the events have been disabled.

3.21 IAPConnect

The IAPConnect command is used by AT2 FW to initiate a connection with the specified Apple iOS device. The remote BD address must be specified.

3.21.1 Syntax

```
AT+AB IAPConnect [BD Addr]
```

Where [BD Addr] is the iOS remote device's BD Address to page.

3.21.2 Responses

If the connection is successful, the response is:

```
AT-AB ConnectionUp [Remote BD Addr]
```

```
AT-AB -iAP-BypassMode-
```

If the connection cannot be completed, the response is:

```
AT-AB iAPConnectionClosed
```

3.22 IAPDisconnect

The IAPDisconnect command is used by AT2 FW to terminate a connection with the remote Apple iOS device.

3.22.1 Syntax

```
AT+AB IAPDisconnect
```

3.22.2 Responses

If the connection is successful, the response is

```
AT-AB iAPConnectionClosed
```

3.23 LinkDisconnect

The LinkDisconnect command is used to terminate a connection with the remote device's link handle.

3.23.1 Syntax

```
AT+AB LinkDisconnect
```

3.23.2 Responses

If the connection is successful, the response is

```
AT-AB ConnectionDown
```

3.24 LocalName

The LocalName command is used to set the name of the device to the name that is reported during device discoveries. By default, the ATn FW interface uses "Amped UP!". Changing the name using this command does not permanently change the local name.

3.24.1 Syntax

```
AT+AB LocalName [name]
```

Where [name] is a string for the new local name (up to 20 characters). The space character is allowed; the name is assumed to be all text up to the end of the command.

3.24.2 Responses

If the operation is successful, the response is:

```
AT-AB LocalNameOk
```

3.25 PortDisconnect

The PortDisconnect command is used to terminate a connection with the remote device port handle. it is supported by AT FW.

3.25.1 Syntax

```
AT+AB PortDisconnect
```

3.25.2 Responses

If the operation is successful, the response is:

```
AT+AB ConnectionDown
```

3.26 Reset

The Reset command is used to reset the ATn FW interface. This is provided in the event that a host application wants to perform a software reset for error recovery. There is a response prior to reset in order to verify that the command was received by the ATn FW interface. A reset requires 1.6 seconds.

3.26.1 Syntax

```
AT+AB Reset
```

3.26.2 Responses

If the operation is successful, the response is:

```
AT-AB ResetPending
```

3.27 RoleSwitch

The RoleSwitch command is used to change a link from/to a Master or Slave role

3.27.1 Syntax

```
at+ab RoleSwitch [bd address] [role]
```

where

- [bd address] is the address of the remote device that will receive the role switch
- [role] is the new role of the local device: 0=Master, 1 =Slave

3.28 ShowDev

The ShowDev command is used to list the contents of the Bond Table.

3.28.1 Syntax

```
AT+AB ShowDev
```

3.28.2 Responses

This command returns the list of all the devices bonded, identified by their BD Address.

3.29 SmartCableSetup

The SmartCableSetup command is used to enable and configure a Smart Cable device. A device's BD Address is specified in order to automatically establish a connection, replacing the need for AT connection commands. This command will override the dynamic configuration of a Smart Cable device until the DeleteSmartCable command is issued; it is saved in non-volatile memory.

3.29.1 Syntax

```
AT+AB SmartCableSetup [BD address] [Attempts] [Interval]
```

Where [BD address] is the BD address of the remote device to page and attempt to connect. [Attempts] 0 - 999 is the number of pages that will be attempted to the specified device until a connection is successful. A value of 0 will not automatically page the remote device. A value of 1000 will perform unlimited pages until the connection is switched from command mode to bypass mode to exchange data.

[Interval] 1-1000 is the number of 100 ms intervals (0.1 sec to 100 sec) between page attempts. This interval is in addition to the amount of time required by the page attempt itself.

3.29.2 Responses

If the operation is successful, the response is:

```
AT-AB SmartCableConfigDone
```

3.30 Sniff

The Sniff command is used by AT2 FW to switch a device from active mode to sniff mode.

3.30.1 Syntax

```
AT+AB Sniff [BD address] [Sniff Interval]
```

Where [BD address] is the BD address of the device to be switched to active mode. [Sniff Interval] is given in slots from 66-10,000.

3.30.2 Responses

If the operation is successful, the response is:

```
AT-AB SniffMode
```

3.31 SPPConnect

The SPPConnect command is used to initiate a connection with the specified device. The remote BD address must be specified. The remote Service is optional. If not specified, the first registered SPP service will be used by default.

3.31.1 Syntax

```
AT+AB SPPConnect [BD Addr] [Service]
```

Where [BD Addr] is the remote device's BD Address to page. [Service] is the specific service on the remote device (optional).

3.31.2 Responses

If the connection is successful, the response is:

```
AT-AB ConnectionUp [Remote BD Addr]
```

```
AT-AB -BypassMode-
```

If the connection cannot be completed, the response is:

```
AT-AB SPPConnectionClosed
```

3.32 SPPDisconnect

The SPPDisconnect command is used to terminate a connection with the remote device.

3.32.1 Syntax

```
AT+AB SPPDisconnect
```

3.32.2 Responses

If the connection is successful, the response is

```
AT-AB SPPConnectionClosed
```

3.33 StreamingSerial

3.33.1 Syntax

```
AT+AB StreamingSerial [Enable/Disable]
```

Where [Enable/Disable] is an "e" or "E" character to enable this parameter and a "d" or "D" character to disable it. Streaming Serial will disable the RTS/CTS hardware flow control and discard non-transmitted data when enabled. RTS/CTS flow control is enabled when Streaming Serial is disabled.

3.33.2 Query

An alternative syntax may be used to query the current StreamingSerial feature status. This syntax is not supported by other commands.

```
AT+AB StreamingSerial
```

3.33.3 Responses

If the feature is successfully applied or queried, the response is:

```
AT-AB StreamingSerial [Enabled/Disabled]
```

3.34 UpdateInquiryScan

The UpdateInquiryScan command is used to modify the Inquiry scan parameters: mode, duration, and interval.

3.34.1 Syntax

```
AT+AB UpdateInquiryScan [mode] [duration] [interval]
```

where [mode] is the discoverable mode:

- 0: non-discoverable
- 1: limited discoverability - not supported
- 2: discoverable

[duration] is the scan length in slots; 18 to 4096. The default duration is 18 slots.

[interval] is the period between scans in slots; 18 to 4096. The default interval is 2048 slots

3.34.2 Responses

If the command is successful, the response is:

```
AT-AB InquiryScanUpdateDone
```

3.35 UpdatePageScan

The UpdatePageScan command is used to modify the Page scan parameters: mode, duration, and interval.

3.35.1 Syntax

`AT+AB UpdatePageScan [mode] [duration] [interval]`

where [mode] is the connectable mode:

- 0: non-connectable
- 1: connectable

[duration] is the scan length in slots; 18 to 4096. The default duration is 18 slots.

[interval] is the period between scans in slots; 18 to 4096. The default interval is 2048 slots

3.35.2 Responses

If the command is successful, the response is:

`AT-AB PageScanUpdateDone`

3.36 Version

The version command is used to return the current version of the ATn FW interface.

3.36.1 Syntax

`AT+AB Version`

3.36.2 Responses

If the operation is successful, the response is:

`AT-AB ATn FWVer [x.y]`

where [x.y] is the current version of the ATn FW interface.

4 Error responses

This chapter details the error responses that occur under specific circumstances.

There are seven error responses that can occur beyond error responses specific to a particular command (e.g., Discovery). They are:

- ErrConnect
- ErrExecute
- ErrFormat
- ErrInvalidParam
- ErrNumParam
- ErrUnknownCmd
- ErrInProgress

The following subsections detail the different error responses. These error responses replace the original error response

AT+AB ErrorCommand

4.1 ErrConnect

The ErrConnect error response will be sent if ATn FW has a valid connection established and the command cannot be executed while connected (even in the command mode). Examples of commands that produce this error response are given in the following table.

Table 3. Example commands that generate <ErrConnect>

| Example | Reason |
|-------------------------------|-------------------------------------------------------------------------------|
| AT+AB Discovery | Performing a device discovery while a connection already exists. |
| AT+AB SPPConnect 00043e000000 | Establishing a connection to a device while a connection exists with another. |

4.2 ErrExecute

The ErrExecute error response will be sent if the command cannot complete for any reason. Examples of commands that produce this error response are given in the following table.

Table 4. Example commands that generate ErrExecute

| Example | Reason |
|-------------|------------------------------------------------------|
| AT+AB Sniff | Execution of sniff while the device is not connected |

4.3 ErrFormat

The ErrFormat error response will be sent if ATn FW receives a command (text terminated by a carriage return or line feed) that does not match the expected format starting with "AT+AB".

Examples of commands that produce this error response are given in the following table.

Table 5. Example commands that generate <ErrFormat>

| Example | Reason |
|-------------------------|-----------------------------------------------------------------|
| AT-AB discovery | A valid command name that does not start with the right prefix. |
| SPPConnect 00043e000000 | A command that does not start with "AT+AB". |
| abcdef | A command that does not start with "AT+AB". |

4.4 ErrInvalidParam

The ErrInvalidParam error response will be sent if the parameters for the requested command are not correct. The parameter(s) will be echoed back to the user starting from the parameter that was rejected.

Examples of commands that produce this error response are given in the following table.

Table 6. Example commands that generate <ErrInvalidParam>

| Example | Response | Reason |
|-------------------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------|
| AT+AB SPPConnect 8136 | AT-AB ErrInvalidParam 8136 | Numeric parameter not specified with required number of digits (BD address must always be 12 hex characters). |
| AT+AB SPPConnect 00043e008136 GOEP | AT-AB ErrInvalidParam goep | Unrecognized (or unsupported) symbolic parameter used. |
| AT+AB ChangeBaud 1600 | AT-AB ErrInvalidParam 1600 | Numeric parameter is out of range (specified baud rate is not supported by command). |
| AT+AB EnableBond 00043e000000 12345678901234567 | AT-AB ErrInvalidParam 12345678901234567 | String parameter (PIN) has too many characters. |

4.5 ErrNumParam

The ErrNumParam error response will be sent if there are too few parameters for the requested command. A command sent with too many parameters does not generate an error; instead, the extra parameters are ignored.

Note: Some commands will accept a variable number of parameters.

Examples of commands that produce this error response are given in the following table.

Table 7. Example commands that generate <ErrNumParam>

| Example | Reason |
|-------------|-----------------------------------------------------|
| AT+AB Sniff | The minimum number of parameters was not specified. |

4.6 ErrUnknownCmd

The ErrUnknownCmd error response will be sent if the requested command is not recognized. The unrecognized command will be echoed back to the host. Any parameters given will be ignored.

AT+AB ErrUnknownCmd [unrecognized command]

An accepted command always starts with the command identifier:

AT+AB

4.7 ErrInProgress

ErrInProgress is sent in response to the Discovery command being issued when the previous one is still in progress.

AT+AB Discovery [unrecognized command]

Examples of commands that produce this error response are given in the following table:

Table 8. Example commands that generate <ErrInProgress>

| Example | Reason |
|-----------------|--------------------------------------------------------------------------------|
| AT+AB Discovery | Trying to issue the Discovery command when the previous one has not completed. |

5 Other responses

The following subsections describe types of responses that occur under specific circumstances, not necessarily as a result of a specific command. They are:

- Reset
- Escape sequence

5.1 Reset

Upon either a hardware reset or software reset (such as the Reset command), ATn FW will respond as follows after the reset is complete:

```
AT-AB -CommandMode-  
AT-AB BDAddress [BD addr]
```

Because the BD address of the local device is reported during this response, the response is different than a response to the Escape Sequence.

5.2 Escape sequence

If the escape sequence, "`^#^$^%`", is received and no connection is active, ATn FW will immediately respond with:

```
AT-AB -CommandMode-
```

When the escape sequence is received while a connection is still active and there is no data for 2 seconds, ATn FW will respond (after those 2 seconds of no data) with the same string. ATn FW will now be in command mode.

5.3 Remote escape sequence

The remote escape sequence, supported by AT2 FW, allows a remote device to enter in a mode where it can be controlled and configured by a BT link using a local host and Bluetooth device.

To enable Remote Control the configuration variable `RmtEscapeSequence` must be set to true.

The Remote escape sequence is "`@#@$@%`" and it must be sent by the local host in a single complete packet over the BT link with no CR or LF in the sequence.

When received, the remote device will respond locally with:

```
AT-AB RemoteMode.
```

Appendix A FW configuration variables

The system configuration settings for each firmware version are given in the tables that follow .

In order to set a configuration variable, enter "at+ab config xxxx = yyyy", where "xxxx" is the variable name and "yyyy" is the value to set. A variable name could also be specified as "varzz", where zz is the sequence number of the variable.

A.1 AT FW version 1.2

Table 9. System configuration settings - version 1.2

| AT version 1.2 system configuration settings – version 1.2 | | | |
|------------------------------------------------------------|---------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var01 | BuildVersion | xxxxxxx | Date code software was built. |
| Var03 | BD_ADDR | 00043e260e73 | Bluetooth device address (Read-only). |
| Var04 | DeviceName | Amp'ed Up! | Code used for secure connection. Up to 20 characters are allowed (case sensitive). |
| Var05 | StreamingSerial | True | When true, hardware RTS/CTS flow control is disabled and data not able to be transmitted over the link will be discarded. When False, RST/CTS flow control is enabled. |
| Var06 | PIN | 1234 | Code used for pairing. Up to 16 characters are allowed (case sensitive). |
| Var07 | UartBaudrate | 115200 | Main UART baudrate: 1200 to 921,600 baud. |
| Var08 | UartParity | None | Main UART parity. |
| Var09 | UartDataBits | 8 | Main UART data bits per character. |
| Var10 | UartStopBits | 1 | Main UART number of stop bits. |
| Var11 | UartTimeout | 44 | Timeout used to determine the end of a message in units of bit times: from 8 to 128 are allowed. |
| Var12 | AutoSniff | False | This enables the sniff feature when the link is inactive automatically. |
| Var13 | AutoSniffTimeout | 5 | The inactivity timeout in seconds used for AutoSniff above. |
| Var14 | AutoSniffInterval | 1000 | Sniff Slot interval applied AutoSniff. |
| Var15 | HostDeepSleepEnable | False | Enables deep sleep mode. |
| Var16 | GPIO_HostKeepAwake | None | GPIO register used to prevent the module from entering deep sleep mode. A setting of none means that this function is disabled. |
| Var17 | GPIO_HostWakeup | None | GPIO register used to wake up the module after it enters deep sleep mode. A setting of none means that this function is disabled. |

Table 9. System configuration settings - version 1.2 (continued)

| AT version 1.2 system configuration settings – version 1.2 | | | |
|------------------------------------------------------------|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var18 | UseSmallPackets | False | If true, only DM1, DH1, DM3, DH3 packets are allowed on a link. EDR is disabled. |
| Var19 | EnableAFH | True | Enable/disable the adaptive frequency hopping mode. |
| Var20 | EnablePowerControl | False | Enable/disable the bluetooth dynamic power control feature. |
| Var21 | HostFlowControl | 0 | Reserved for future usage. |
| Var22 | ATReply | AT-AB | Sets the AT command reply prefix. All events that are displayed are prefixed by this character string (case sensitive). |
| Var23 | QoS_Latency | 20 | Sets the quality of service latency from 3 to 20 Slots. A slot size is 625 microseconds. |
| Var24 | CpuMHz | 32 | Sets the module's CPU speed: 2, 4, 8, 12, 16, 20, 24, 28, 32, 36 and 64 MHz are allowed. (Note: CPUMHz: 40 to 63 are not supported.) |
| Var25 | HciBaudrate | 921600 | Baud rate of the HCI interface to the Bluetooth controller: 230,400; 460,800; 921,600; and 2,000,000 baud are allowed. |
| Var26 | SPIEnable | False | Enables the SPI interface to external pins. |
| Var27 | SPIMode | Slave | Mode of the SPI. |
| Var28 | I2CEnable | False | Enables the I ² C interface to external pins. (Note: not supported) |
| Var29 | COD | 000000 | Bluetooth Class of Device. |
| Var30 | LinkSecurity | False | |
| Var31 | HostEvents | True | All host events are sent when true. |
| Var32 | BondingAllowed | True | Automatically allows bonding by default when true. |
| Var33 | PageScan | True | Enables Page scan when true, or halts Page scan when false. |
| Var34 | InquiryScan | True | Enables Inquiry scan when true, or halts Inquiry scan when false. |
| Var35 | MPMode | 0 | 0 = point-to-point, 1 = multipoint using packet protocol, 2 = broadcast. |
| Var36 | UseExtLPO | False | True when a 32.768 kHz low power oscillator is present, and false if not present. |
| Var37 | HSE_MHz | 13 | MHz rating of the main crystal oscillator (read-only) |
| Var38 | EnableEncryption | False | Set to true to enable the Bluetooth link encryption |

Table 9. System configuration settings - version 1.2 (continued)

| AT version 1.2 system configuration settings – version 1.2 | | | |
|------------------------------------------------------------|-----------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var39 | DefaultSecurity | 1 | Default security mode should be 1 for no security or 4 for authentication required. Modes 2 and 3 are used for legacy compatibility. |
| Var40 | DefaultAuthentication | 4 | Establishes which level of SSP authentication is enabled. Possible values are 4 - SSP Just works or 5 - SSP pairing modes with MITM protection. |

A.2 AT2 FW version 1.3

Table 10. System configuration settings - version 1.4

| AT2 version 1.4 - system configuration settings – version 1.4 | | | |
|---------------------------------------------------------------|------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var01 | BuildVersion | xxxxxxx IDPS | Date code software was built. |
| Var03 | BD_ADDR | 00043e212345 | Bluetooth device address (read-only). |
| Var04 | DeviceName | Amp'ed Up! | Code used for secure connection. Up to 20 characters are allowed (case sensitive). |
| Var05 | StreamingSerial | True | When true, hardware RTS/CTS flow control is disabled and data not able to be transmitted over the link will be discarded. When false, RST/CTS flow control is enabled. |
| Var06 | PIN | 1234 | Code used for pairing. Up to 16 characters are allowed (case sensitive). |
| Var07 | UartBaudrate | 115200 | Main UART baud rate: 1200 to 921,600 baud. |
| Var08 | UartParity | None | Main UART parity. |
| Var09 | UartDataBits | 8 | Main UART data bits per character. |
| Var10 | UartStopBits | 1 | Main UART number of stop bits. |
| Var11 | UartTimeout | 16 | Timeout used to determine the end of a message in units of bit times: from 8 to 128 are allowed. |
| Var12 | AutoSniff | False | This enables the sniff feature when the link is inactive automatically. |
| Var13 | AutoSniffTimeout | 5 | The inactivity timeout in seconds used for AutoSniff above. |
| Var14 | AutoSniffInterval | 1000 | Sniff Slot interval applied AutoSniff. |
| Var15 | HostShallowSleepEnable | True | Enables shallow sleep mode. |
| Var16 | HostDeepSleepEnable | False | Enables deep sleep mode. |

Table 10. System configuration settings - version 1.4 (continued)

| AT2 version 1.4 - system configuration settings – version 1.4 | | | |
|---------------------------------------------------------------|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var17 | GPIO_HostKeepAwake | None | GPIO register used to prevent the module from entering deep sleep mode. A setting of none means that this function is disabled. |
| Var18 | GPIO_HostWakeup | None | GPIO register used to wake up the module after it enters deep sleep mode. A setting of none means that this function is disabled. |
| Var19 | UseSmallPackets | False | If true, only DM1, DH1, DM3, DH3 packets are allowed on a link. EDR is disabled. |
| Var20 | EnableAFH | True | Enable/Disable the Adaptive Frequency Hopping mode. |
| Var21 | EnablePowerControl | True | Enable/Disable the Bluetooth Dynamic power control feature. |
| Var22 | HostFlowControl | 0 | Reserved for future usage. |
| Var23 | ATReply | AT-AB | Sets the AT command reply prefix. All events that are displayed are prefixed by this character string (case sensitive). |
| Var24 | QoS_Latency | 20 | Sets the Quality of Service Latency from 3 to 20 slots. A slot size is 625 microseconds. |
| Var25 | CpuMHz | 32 | Sets the module’s CPU speed: 2, 4, 8, 12, 16, 20, 24, 28, 32, 36 and 64 MHz are allowed. (Note: CPUMHz: 40 to 63 are not supported.) |
| Var26 | HciBaudrate | 921600 | Baud rate of the HCI interface to the Bluetooth controller: 230,400; 460,800; 921,600; and 2,000,000 baud are allowed. |
| Var27 | SPIEnable | False | Enables the SPI interface to external pins. |
| Var28 | SPIMode | Slave | Mode of the SPI. |
| Var29 | I2CEnable | False | Enables the I ² C interface to external pins. (Note: not supported) |
| Var30 | COD | 240404 | Bluetooth Class of Device. |
| Var32 | HostEvents | True | All host events are sent when true. |
| Var33 | BondingAllowed | True | Automatically allow bonding by default when true. |
| Var34 | PageScan | True | Enables page scan when true, or halts page scan when false. |
| Var35 | InquiryScan | True | Enables inquiry scan when true, or halts inquiry scan when false. |
| Var36 | MPMode | 0 | 0 = point-to-point, 1 = multipoint using packet protocol, 2 = broadcast. |
| Var37 | UseExtLPO | False | True when a 32.768 kHz low power oscillator is present, and false if not present. |

Table 10. System configuration settings - version 1.4 (continued)

| AT2 version 1.4 - system configuration settings – version 1.4 | | | |
|---------------------------------------------------------------|-----------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Variable | Name | Default | Description |
| Var38 | HSE_MHz | 13 | MHz rating of the main crystal oscillator (Read-only) |
| Var39 | EnableEncryption | True | Set to true to enable the Bluetooth link encryption |
| Var40 | DefaultSecurity | 4 | Default security mode should be 1 for no security or 4 for authentication required. Modes 2 and 3 are used for legacy compatibility. |
| Var41 | DefaultAuthentication | 5 | Establishes which level of SSP authentication is enabled. Possible values are 4 - SSP Just works or 5 - SSP pairing modes with MITM protection. |
| Var42 | EnableIAP | True | Enables IAP mode to support iOS devices. |
| Var43 | AllowSniff | False | Enables sniff mode. |
| Var44 | iAPAppID | A1B2C3D4E5 | This variable identifies the iOS application ID. |
| Var45 | iAPPProtocolStrMain | com.****.Demo | This variable defines the main connecting string for the iOS application. |
| Var46 | iAPPProtocolStrAlt | com.****.Protocol Alt | This variable defines the alternative connecting string for the iOS application. |
| Var47 | CPI2CMode | 3 | Apple CP chip I ² C address mode 2 or 3. |
| Var48 | SPP128UUID | True | This variable enables the 128-bit UUID for the Android devices. |
| Var51 | RmtEscapeSequence | False | Set to true to enable Remote Control Mode. |

Revision history

Table 11. Document revision history

| Date | Revision | Changes |
|-------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08-Jun-2012 | 1 | Initial release. |
| 23-Jul-2012 | 2 | – Modified: Introduction – Added in Table 2 : cptest and role switch – Added in Table 9 : Var40 and 41 – Added: Section 3.2, 3.8.1, 3.8.2, 3.27, 3.27.1 – Added in Table 10 : Var51 |

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